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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte D. AMNON SILVERSTEIN

Appeal 2009-005723
Application 10/698,926
Technology Center 2600

Before JOHN C. MARTIN, MAHSHID D. SAADAT,
and MARC S. HOFF, *Administrative Patent Judges*.

SAADAT, *Administrative Patent Judge*.

DECISION ON APPEAL¹

¹ The two month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304 or for filing a request for rehearing as recited in 37 C.F.R. § 41.52, begins to run from the “MAIL DATE” (paper delivery mode) or the “NOTIFICATION DATE” (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

Appellant appeals under 35 U.S.C. § 134(a) from a Final Rejection of claims 1-11, 15-22, and 27, which constitute all the claims pending in this application. Claims 24-26 are withdrawn from consideration and claims 12-14 and 23 are cancelled. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

STATEMENT OF THE CASE

Appellant's invention relates to an imaging apparatus and method that includes an image sensor having a plurality of color sensor arrays. The individual sensor arrays include a plurality of sensor elements configured to provide image data for a plurality of pixels of a respective color component at an initial resolution. The plurality of color sensor arrays overlap and are offset with respect to one another to define a plurality of sub-pixels for individual ones of the pixels. The imaging apparatus includes processing circuitry configured to access the image data for at least one pixel from each of the plurality of color sensor arrays, and using the accessed image data, to determine sub-pixel image data for the respective sub-pixels to form an image of an increased resolution compared with the initial resolution of the color sensor arrays. (Spec. ¶ [0007].)

Claim 1, which is illustrative of the invention, reads as follows:

1. An imaging apparatus comprising:
an optical device configured to receive light and to
provide a plurality of color components of the received light;
an image sensor including:
a plurality of color sensor arrays arranged
elevationally over one another and configured to receive
respective ones of the color components, and the color sensor
arrays individually comprising a plurality of sensors configured

to provide image data for a plurality of pixels of a respective one of the color components at an initial resolution; and
wherein the plurality of color sensor arrays overlap and are offset with respect to one another to define a plurality of sub-pixels for individual ones of the pixels; and
processing circuitry configured to access the image data for pixels from each of the plurality of color sensor arrays, and using the accessed image data, to determine sub-pixel image data for the respective sub-pixels to form an image of an increased resolution compared with the initial resolution of the color sensor arrays.

The Examiner relies on the following prior art in rejecting the claims:

| | | |
|---------------|--------------|---------------|
| Akami | US 3,942,154 | Mar. 2, 1976 |
| Colvocoresses | US 4,765,564 | Aug. 23, 1988 |

Claims 1-7, 9-11, 15, 16, and 27 stand rejected under 35 U.S.C.

§ 102(b) as anticipated by Colvocoresses.

Claims 8 and 17-22 stand rejected under 35 U.S.C. § 103(a) as obvious over Colvocoresses in view of Akami.

Rather than repeat the arguments here, we make reference to the Brief (filed Aug. 29, 2008 to supplement the original Brief filed Apr. 1, 2008) and the Answer (mailed Sep. 30, 2008) for the respective positions of Appellant and the Examiner. Only those arguments actually made by Appellant have been considered in this decision. Arguments that Appellant did not make in the Brief have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii).

ISSUES

With respect to independent claims 1, 10, 17 and 27, Appellant separately argues the patentability of each independent claim and further

separately argues the patentability of dependent claims 11 and 22.

Regarding claims 2-9, 15, 16, and 18-21, Appellant relies on the arguments made for the patentability of the claims from which they depend, so that claims 2-9, 15, 16, and 18-21 stand or fall with the claims from which they depend.

The issues to be decided are:

- 1 Is claim 1 properly rejected as anticipated by Colvocoresses?
- 2 Is claim 10 properly rejected as anticipated by Colvocoresses?
- 3 Is claim 11 properly rejected as anticipated by Colvocoresses?
- 4 Is claim 27 properly rejected as anticipated by Colvocoresses?
- 5 Is claim 17 properly rejected as obvious over Colvocoresses in view of Akami?
- 6 Is claim 22 properly rejected as obvious over Colvocoresses in view of Akami?

PRINCIPLES OF LAW

[The USPTO] applies to the verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's specification.

In re Morris, 127 F.3d 1048, 1054 (Fed. Cir. 1997).

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros., Inc. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987). “These elements must be arranged as in the claim

under review, but this is not an ‘*ipsissimis verbis*’ test”. *In re Bond*, 910 F.2d 831, 832 (Fed. Cir. 1990) (citations omitted).

ANALYSIS

Claim 1

Appellant contends that Colvocoresses fails to disclose each and every element set forth in claim 1. In particular, while Appellant does not challenge the reference’s teachings with respect to an image sensor including a plurality of overlapped and offset color sensors, Appellant contends that Colvocoresses fails to teach “an optical device configured to receive light and to provide a plurality of color components of the received light” (Br. 3).

The Examiner points, *inter alia*, to the elements identified as “optics” in Figure 1 and as “optic means” in Figures 7 and 8 of Colvocoresses, and to Colvocoresses’s disclosure, in column 3, lines 4-15, that its overlapped detector means are to be used with electromagnetic energy in different wave bands, including, for example, the visible light color bands of blue, green, and red for teaching an optical device (Ans. 11-12). The Examiner concludes that a person having ordinary skill in the art would understand that Colvocoresses discloses “an optical device configured to receive light and to provide a plurality of color components of the received light” (Ans. 12).

As acknowledged by Appellant (Br. 4), Colvocoresses discloses the optics element or an optic means. We also find that the color sensors, as described in column 3 of the reference, are provided with a plurality of color components of the received light. Therefore, we agree with the Examiner

and find reasonable the Examiner's analysis (Ans. 3-4, 10-12) because we find no difference in vocabulary between claim 1 and Colvocoresses. *See Bond*, 910 F.2d at 832. We conclude that the Examiner's rejection of claim 1, as well as dependent claims 2-9 argued together as one group (Br. 3-4), is proper.

Claim 10

Appellant contends that Colvocoresses fails to disclose each and every element set forth in claim 10. In particular, Appellant contends that Colvocoresses fails to teach "an image sensing means implemented as a single device and comprising plural color sensor arrays" (Br. 5). However, Appellant does not provide any definition in the Specification for the disputed term, "single device," nor any reason why the solid state apparatus disclosed in the reference does not meet the recited "single device."

The Examiner (Ans. 14) relies on the holding in *Morris*, 127 F.3d at 1054, and points out that the PTO must give words in a claim their broadest reasonable meaning in their ordinary usage, as understood by one of ordinary skill in the art. In giving words their broadest reasonable meaning, the PTO must "tak[e] into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's specification." *Id.*

The Examiner states that

Colvocoresses teaches "an image sensing means", by teaching multiple offset arrays responsive to different wavelengths used to create a number of sub-pixels in each picture element (figs. 2(b) and 3(b); col. 3, lines 4-46; col. 3, lines 17-22). Further, Colvocoresses teaches that the multiple offset arrays (image sensing means) require employment/implementation, in concert, in an overlap fashion, to create the resultant multiple

response differences (col. 4, lines 37-39; col. 5, line 20 - col. 6, line 17; fig. 6), i.e., image sensing means implemented as a single device.

This teaching by Colvocoresses is interpreted to correspond with image sensing means (multiple offset arrays) implemented as a single device (multiple offset arrays employed /implemented, in concert, in an overlap fashion)

(Ans. 13 (emphases omitted)).

In reviewing Appellant's Specification and originally filed claims, the only guidance we find for the meaning of an image sensing means "implemented as a single device" is the use of a single diagrammatic block 208 representing the image sensor in Figure 2 and the use of the reference number for that diagrammatic block to refer to the image sensor as a whole in the Specification (*see, e.g.*, Spec. ¶ [0029]). In the portions of the Specification cited by Appellant for describing the subject matter claimed in claims 10 and 11 (Br. 2) we find a description of stacking the individual sensor arrays in an offset manner but no more specific guidance as to the meaning of "implemented as a single device" (Spec. ¶¶ [0029], [0036]). Indeed, the only use of the phrase "single device" or the like that we find in the Specification, drawings, or the originally filed claims states that "memory 120 and processing circuitry 122 may be embodied within a single device" and does not mention the image sensing means (Spec. ¶ [0022]). We note that Colvocoresses also describes stacking of individual sensor arrays in an offset manner (Colvocoresses Fig. 3(b)) and refers to the sensor arrays ("offset detector elements") as a single component within a single diagrammatic block (Colvocoresses Figs. 7, 8).

Accordingly, we agree with the Examiner's analysis regarding claim 10 (Ans. 6, 12-14) and find that claim 10 and dependent claims 15 and 16, not argued separately, are properly rejected.

Claim 11

Although argued separately, Appellant's contentions regarding claim 11 are substantially the same as for claim 10 (Br. 10) from which claim 11 depends. For the reasons set forth *supra* for claim 10 and by the Examiner for claim 10 (Ans. 12-14) and claim 11 (Ans. 21), we find that claim 11 is properly rejected.

Claim 27

With regard to claim 27, Appellant contends that Colvocoresses does not disclose the claim limitation reciting "a sum of the image data values comprising intensity values for a single color component for the single pixel location are equal to an intensity value of the accessed image data for the single color component for the single pixel location" (Br. 6-7). Appellant further points to the absence of the words "summing" and "intensity" from Colvocoresses (Br. 7).

The Examiner responds by expanding upon the explanation provided in the Final Rejection. In particular, the Examiner asserts that, giving the claim limitation its broadest reasonable interpretation, *Morris*, 127 F.3d at 1054, the claim limitation merely requires that the stored or accessed intensity value of a pixel is equal to the total of the subpixel intensity values generated for that pixel (Ans. 15). The Examiner finds support for this interpretation in the Specification, which states that "a sum of intensities of the sub-pixels is equal to an intensity of the individual respective pixel

having such sub-pixels” (Spec. ¶ [0040]; Ans. 15). The Examiner then states:

Correspondingly, Colvocoresses teaches, for example, with three wave bands, 9 sub-pixels are produced from each basic pixel, thus increasing the amount of data to be processed nine fold (col. 4, lines 37-39; also see fig. 5 and col. 6, lines 5-10). In other words, the data employed by Colvocoresses to represent one pixel is based on data generated by its sub-pixels, which is also to say, the sum of its sub-values equals the value of the image data for that pixel.

(Ans. 15).

The Examiner further answers Appellant’s arguments regarding the absence of the word “summing” from Colvocoresses by stating that

the Colvocoresses reference does provide for addition of the sub-pixels, i.e., a summing, to generate pixel data (col. 4, line 56 - col. 6, line 10), as well as teach that, for example, data from 9 sub-pixels can be produced from a basic pixel (col. 4, lines 37-39), wherein the result produced is interpreted to be equal to “summing”, i.e., the sum of the parts equal the whole.

(Ans. 16).

In addition, regarding “intensity values,” the Examiner answers that one skilled in the art would understand that “radiance,” as used by Colvocoresses, and “intensity” are equivalent terms that express the same concept of the amount of light impinging on a pixel, and that, regardless of which term is used, the response of pixel will be a signal, usually a voltage, related to the amount of light impinging on the pixel (Ans. 16-17).

Appellant did not file a Reply Brief under 37 C.F.R. § 41.41 and thus has not used this avenue to challenge these additional explanations by the Examiner. Accordingly, Appellant has waived, in this appeal, any argument that these additional findings are erroneous.

Therefore, because we find that mere differences in vocabulary between claim 27 and Colvocoresses, *see Bond*, 901 F.2d at 832, are not sufficient to distinguish the claimed subject matter over the applied prior art and because Appellant does not identify, let alone address, any error in, the Examiner's expanded explanation in the Answer, we find that the rejection of claim 27 is proper.

Claim 17

Appellant contends that the rejection of claim 17 was based on an improper combination of Colvocoresses and Akami, in that, even if combined, the references do not disclose or suggest the positively recited limitations of claim 17 (Br. 8). Appellant further contends that the Examiner has not provided an adequate rationale for the combination of the references (Br. 8-9). Appellant specifically characterizes as faulty the Examiner's rationale that the prism of Akami eliminates the need for Colvocoresses to rely solely on color filters to filter out specific colors (Br. 8). Appellant further points to the absence of any mention of "filtering or providing different light components corresponding to different wavelengths of light" in Colvocoresses (Br. 8).

In response, the Examiner expands upon the rationale and explanation provided in the Final Rejection. The Examiner points out, *inter alia*, that "Colvocoresses directly relates to the functionality of multiple imaging arrays, each responsive to a different waveband of light (a filtering function specific to each array)" (Ans. 20). Implicit in this explanation is that a person having ordinary skill in the art would understand that in order for Colvocoresses's imaging arrays to be responsive to different wavelengths of light (such as blue, green, and red), some filtering function is necessarily

present, whether by means of an optical filter, by tuning the sensors to respond to particular wavelengths of light, or otherwise.

The Examiner further points out that it would be obvious to a person having skill in the art to

separate the different waves of light (blue, green and red) [using Akami's prism], because receiving light specific to an [sic] particular array is an obvious advantage to its functionality, as it prevents the pixel from generating false responses caused by other closely related wavelengths that may affect the pixel if received (as no sensor is inherently perfect in limiting the specific range of wavelengths affecting its response, the greater the filtering into specific ranges, the more representative the response).

(Ans. 19).

Appellant did not file a Reply Brief under 37 C.F.R. § 41.41 and thus has not used this avenue to challenge these additional findings by the Examiner. Accordingly, Appellant has waived, in this appeal, any argument that this additional explanation is erroneous.

Therefore, because Appellant does not specifically identify, let alone address any error in, the Examiner's expanded explanation and rationale in the Answer, we find that the rejection of claim 17 and dependent claims 18-21 is proper.

Claim 22

In addition to alluding to Appellant's arguments regarding claim 17, from which claim 22 depends, Appellant argues that Akami does not cure the deficiencies of Colvocoresses, in that Akami does not teach "using the optical device comprising a lens, providing light into a plurality of light components corresponding to different wavelengths of the light" (Br. 11).

In addition to the Examiner's answer regarding claim 17, discussed *supra*, the Examiner expands upon the explanation provided in the Final Rejection to clarify the ground for rejection of claim 22. In particular, the Examiner has pointed out that in the "SUMMARY OF CLAIMED SUBJECT MATTER" section (Br. 2) Appellant has cited passages of the drawings and Specification (Fig. 4B; Spec. 9, l. 1) as describing the subject matter of claim 22. The Examiner finds that this cited passage identifies the disclosed optical device to be a prism, and therefore, Appellant has defined or taught a "prism" as a "lens" in the Specification (Ans. 22-23). The Examiner further concludes that "the prism acting as a spectral apparatus (element 15) as taught by Akami is interpreted to be the lens/optical device used in 'providing light into a plurality of light components corresponding to different wavelengths of the light' of the method claim as currently presented" (Ans. 23).

Appellant did not file a Reply Brief under 37 C.F.R. § 41.41 and thus has not used this avenue to respond to or challenge the additional explanation by the Examiner. Accordingly, Appellant has waived, in this appeal, any argument that the additional explanation is erroneous.

Therefore, because Appellant does not identify, let alone address, any error in, the Examiner's expanded explanation in the Answer, we find that the rejection of claim 22 is proper.

CONCLUSION

On the record before us, we find that claims 1-11, 15-22, and 27 are properly rejected.

Appeal 2009-005723
Application 10/698,926

ORDER

The decision of the Examiner to reject claims 1-11, 15-22, and 27 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1). *See* 37 C.F.R. § 1.136(a)(1)(v) (2010).

AFFIRMED

babc

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